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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/810,619	SU ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination (RCE)

1. The request filed on 2/16/2006 for an RCE is acceptable and a CPA has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Beretta et al (US 4,897,369).

Beretta et al teaches a bath tank M, a rotatable wafer chuck G and H, an element provided by pulley transmission system O., see col. 2.

Regarding the wafer being covered with a metal layer. This is a matter of an intended and is not given patentable weight the apparatus of Berretta et al is inherently capable of removing a metal layer.

Note the wafers are non-moveable with respect to the carrier as it rotates, this occurs inherently as the wafer does not move as it is firmly held by the chuck as it is supported during rotation of the chuck.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Berdan et al (US 3,898,095).

Regarding claims 2 and 4: Beretta fails to teach a front suppression line.

Berdan et al teaches a method of etching aluminum.

Berdan et al teaches a manifold pipe 22 (front suppression line and rinse lines).

Berdan et al teaches in col.3 lines 43-48 that the front suppression line is used to rinse the etchant from the front of the substrate.

Regarding claim 6: Berdan et al illustrates Fig.1 Manifold pipes 22 are placed along the wafer.

Regarding claims 8, 10, and 12: Rear suppression line 22 illustrated in Fig.1. The apparatus comprised a rear rinse line disposed behind the wafer

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a rinse and suppression in the apparatus of Beretta to keep the etching from splashing on the wafer and to ensure that the wafer rinsed prior to the next processing step as taught by Berdan et al.

Regarding claims 3,5,7,9, 11, and 13: The rinsing apparatus of Berdan et al (element 22) is inherently capable of supplying the gas at the recited flow rate. This limitation is a process limitation, does not provide further structural limitation, and is not given

patentable weight. Alternatively, it would have been obvious to provide the rinsing fluid at the recited rate in that it is a matter of optimization.

Thus it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to introduce a rinsing fluid in the recited range in order to provide an optimal flow rate, and thus provide a more consistent and uniform manufacturing process.

5. Claims 14, 15, 24, 26, and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Brown et al (US 2003/0209255).

The teachings of Beretta et al were discussed above.

Beretta et al fails to teach that the wafer has a metal layer.

Brown et al teaches backside etching in a scrubber. Wafer W has a copper layer (Regarding claim 24) formed on the front side of the wafer according to page 1 [0011].

The motivation to provide the wafer with a metal layer is that it is the desired layer for the optimal process result.

Thus it would have been obvious at the time of the claimed invention to provide a wafer with a metal layer as taught by Brown et al.

Regarding claim 15: All fail to teach the location of the portion is a specific dimension from the wafer edge. However, the apparatus resulting from the modification of the apparatus of Beretta et al with those of Brown et al is obvious capable of removing this range according to In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative

dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to remove the portion of the wafer layer in the range as recited in clam 15.

Regarding claim 30: The entire wafer Beretta et al is rotated including the backside.

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Ching et al.

The teachings of Beretta et al were discussed above. Beretta et al fails to teach the speed of rotation of the wafer.

Ching et al teaches a ferris wheel like stripping or cleaning mechanism, see abstract and Figs. 3B,4B, 5B and 6B. Wafers 306 are held in a vertical orientation by holder 308 see col. 3 line 48- col.4 line 9.Col. 3 lines 32-47

Ching teaches that the wafer is rotated between 0.5 and 100 RPM see col.4 lines 25-29.

The speed of rotation of the spinning wafer is an optimizable parameter that would affect the throughput of the cleaning process.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to design the apparatus of Beretta et al to rotate the wafer at the speed taught by Ching et al.

7. Claims 14, 15,24 and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Brown et al (US 2003/0209255).

The teachings of Beretta et al were discussed above.

Beretta et al fails to teach that the wafer has a metal layer.

Brown et al teaches backside etching in a scrubber. Wafer W has a copper layer (Regarding claim 24) formed on the front side of the wafer according to page 1 [0011].

The motivation to provide the wafer with a metal layer is that it is the desired layer for the optimal process result.

Thus it would have been obvious at the time of the claimed invention to provide a wafer with a metal layer as taught by Brown et al.

Regarding claim 15: All fail to teach the location of the portion is a specific dimension from the wafer edge. However, the apparatus resulting from the modification of the apparatus of To Yoichi with those of Brown et al is obvious capable of removing this range according to In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to remove the portion of the wafer layer in the range as recited in clam 15.

Regarding claims 27-30: Beretta et al holds the backside of the wafer and rotates the backside, see Figs. 1 and 2.

8. Claims 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Brown et al as applied to claims 14, 15, 24,and 26 above, and further in view of Berdan et al.

The teachings of the primary references modified by Beretta et al were discussed above. All fail to teach a front suppression or rinse flow.

Berdan et al teaches a method of etching aluminum.

Berdan et al teaches a manifold pipe 22 (front suppression line and rinse lines).

Berdan et al teaches in col.3 lines 43-48 that the front suppression line is used to rinse the etchant from the front of the substrate.

Berdan et al illustrates Fig.1 Manifold pipes 22 are placed along the wafer.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a rinse and suppression in the apparatus of the primary references modified by Brown et al to keep the etching from splashing on the wafer and to ensure that the wafer rinsed prior to the next processing step as taught by Berdan et al.

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Brown et al as applied to claims 14, 15, 24,and 26 above, and further in view of Dunn (US 6,539,963).

The teachings of Beretta et al in view of Brown et al were discussed above.

The resulting combination fails to teach a bath comprising a solution of sulfuric acid, hydrogen peroxide, and DI water.

Dunn teaches a wet processing system 10 filled with "Piranha" which is a mixture of sulfuric acid, hydrogen peroxide, and DI water see col.4 lines 32-38. Dunn notes that the type of etchant mixture used is based upon the type wafer used and the desired processing result. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a Piranha solution as the etchant mixture.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beretta et al in view of Brown et al as applied to claims 14, 15, 24,and 26 above, and further in view of Erk et al (US 5,593,505).

The teachings of Beretta et al in view of Brown et al were discussed above.

The resulting combinations fail to teach a wafer rotated at a speed of 5 to 300 rpm.

Erk et al teaches a method and apparatus of wet etching wherein a wafer is rotated. According to col.6 lines 15-20 the wafer is rotated at 8 rpm and preferably 12 and 18 rpm. The rotation speed is an optimizable parameter. The motivation to combine the teachings of Erk et al in the method of Beretta et al modified by Brown et al is that the rotational speed of Erk et al will result in a more uniformly processed wafer.

Response to Arguments

11. Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection. The amendment requiring that only the edge be immersed in the bath is addressed by Beretta et al (US 4,897,369).

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 9 a.m. and 3 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sylvia R MacArthur
Patent Examiner
Art Unit 1763
March 6, 2006